THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 25

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SATWINDER MALHI

Appeal No. 1997-1624
Application No. 08/384,816[1]

ON BRIEF[2]

Before THOMAS, LALL, and GROSS, Administrative Patent Judges.
GROSS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 19 through 25, which are all of the claims pending in this application. In the Examiner's Answer, the

[1] Application for patent filed February 6, 1995. According to appellant, this application is a continuation of Application 08/187,570, filed January 26, 1994, now abandoned, which is a division of Application 07/559,756, filed July 30, 1990, now U.S. Patent No. 5,294,559.

[2] We observe that on November 12, 1999 (paper no. 24), appellant filed a waiver of the oral hearing set for December 6, 1999.

examiner indicated that claim 24 is now allowable.

Accordingly, only claims 19 through 23 and 25 remain before us on appeal.

Appellant's invention relates to vertical transistors having a noncontinuous isolation layer and first and second insulating portions extending from the top and bottom surfaces of the semiconductor substrate, respectively, to the noncontinuous layer for isolating adjacent transistors. Claim 19 is illustrative of the claimed invention, and it reads as follows:

19. A vertical transistor, comprising:

a semiconductor substrate having top and bottom surfaces;

a noncontinuous isolation layer in the semiconductor substrate between the top surface and the bottom surface;

a source region formed in the top surface of the semiconductor substrate above the noncontinuous isolation layer;

a gate electrode formed above the source region;

a first insulating material extending from the top surface of the semiconductor substrate to the noncontinuous isolation layer;

a drain region formed in the semiconductor substrate, a portion of the noncontinuous isolation layer extending into the drain region; and

a second insulating material extending from the bottom surface of the semiconductor substrate to the noncontinuous isolation layer.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Cogan	4,860,081	Aug. 22, 1989
Tamagawa	5,045,900	Sep. 03, 1991
	(effective filing date Oct. 27, 1988)	

Claims 19 through 23 and 25 stand rejected under 35 U.S.C. § 103 as being unpatentable over Tamagawa in view of Cogan.

Reference is made to the Examiner's Answer (Paper No. 20, mailed October 31, 1996) for the examiner's complete reasoning in support of the rejections, and to appellant's Brief (Paper No. 18, filed May 6, 1996) and Reply Brief (Paper No. 21, filed January 7, 1997) for appellant's arguments thereagainst.

OPINION

As a preliminary matter we note that appellant indicates on page 3 of the Brief that the claims are not to stand or fall together. Appellant, however, discusses claims 19 and 25 together, and, therefore, fails to provide arguments as to the separate patentability of claim 25 in accordance with 37 CFR

§ 1.192(c)(7). Therefore, we will treat claims 19 and 25 as standing or falling together, with claim 19 as representative, and each of the remaining claims individually.

We have carefully considered the claims, the applied prior art references, and the respective positions articulated by appellant and the examiner. As a consequence of our review, we will affirm the obviousness rejection of claims 19 through 21 and 25 and reverse the obviousness rejection of claims 22 and 23.

Appellant contends (Brief, pages 3-4) that neither Tamagawa nor Cogan discloses a second insulating material extending from either the bottom surface of the substrate or the drain region to the noncontinuous isolation layer. Although Cogan does not explicitly disclose an insulating material extending from "the bottom surface of the substrate" to "the noncontinuous isolation layer," Cogan shows a silicon dioxide material extending vertically through the entire semiconductor and surrounding each semiconductive element. Cogan explains (column 2, lines 35-47) that the resulting structure has each section electrically isolated from each of the other sections. In view of Cogan, it would have been

obvious to isolate the elements of Tamagawa by forming partitions that extend completely through the semiconductor substrate. Since Tamagawa already includes trenches for isolation which extend to the oxide isolation film (62), it would have been obvious to form the partitions only through the remainder of the substrate, from oxide isolation film (62) to the bottom surface of the substrate, which also is the drain electrode. Accordingly, the combined teachings of Tamagawa and Cogan include an isolation material extending from the drain or the bottom surface of the substrate to the noncontinuous isolation film.

Appellant further argues (Brief, page 4, and Reply Brief, page 4) that Cogan does not disclose a portion of the noncontinuous layer extending into the drain region. However, Cogan need not include a noncontinuous layer extending into the drain region, since the examiner relies on Tamagawa's film 62 for such a layer. Tamagawa discloses layer 63 as being the drain region, with 14 being the drain electrode. Since the drain region and drain electrode must be electrically connected, the portion of layer 61 between layers 63 and 14 must electrically connect the two and, therefore, also be

considered the drain region. Further, since oxide isolation film (62) extends into the portion of layer 61 between layer 63 and element 14, the isolation film extends into the drain region, notwithstanding appellant's unsupported statement to the contrary (Brief, page 5).

The examiner stated at the end of the rejection (Answer, page 4) that the transistors of Cogan can be replaced by the power MOSFET of Tamagawa because they are all vertical power transistors, with no explanation as to the motivation for making such a substitution. Appellant argues at length (Brief, pages 5-6) that replacing Tamagawa's MOSFET with Cogan's devices requires some motivation to do so. We agree. However, viewing the examiner's response to appellant's argument (Answer, paragraph bridging pages 5 and 6), we believe that the examiner was not suggesting a substitution of one transistor for the other. Rather the examiner was attempting to demonstrate that the transistors have similar structures and, therefore, that the teachings of Cogan (for the isolation structure) can be combined with Tamagawa. As Cogan suggests the need for isolation between vertical transistors, Cogan provides motivation for modifying Tamagawa

to include an isolation structure that extends through the entire substrate. Since appellant provides no further arguments with respect to claims 19 and 25, we will affirm the rejection thereof.

Appellant further argues (Reply Brief, page 4) that Tamagawa's noncontinuous layer 62 is not an oxide film because it does not meet all of the claimed structural requirements for the layer. This is a non sequitur. The material and the structure are independent limitations. Tamagawa discloses that layer 62 is an oxide film regardless of whether the layer meets other claimed limitations. The structural limitations allegedly lacking apparently are that Tamagawa does not have an insulating layer extending from the top surface of the semiconductor substrate to the noncontinuous isolation layer where the latter extends into the drain. However, we have found above that layer 62 does extend into the drain. Further, insulating element 64 extends form the top surface of the semiconductor substrate to the noncontinuous layer 62. Therefore, layer 62 meets the structural limitations and is an oxide. Accordingly, we will affirm the rejection of claim 20.

With respect to claim 21, appellant again argues (Reply Brief, page 4) that Tamagawa does not disclose the material since the structure is not met. As explained above, the structure is met by Tamagawa's element 64. Therefore, we are unconvinced by appellant's argument, and we will affirm the rejection of claim 21.

As to claim 22, the examiner asserts (Answer, page 6) that it would have been obvious to use polymide for the second isolation material "because it is one of many electrical isolation materials for electrical isolation in semiconductor." Appellant contends (Reply Brief, page 4) that the examiner has not provided motivation for selecting polymide as the second isolation material. We agree with appellant that the examiner has failed to provide sufficient motivation for using polymide instead of the silicon dioxide disclosed by Cogan. "There must be some reason, suggestion, or motivation found in the prior art whereby a person of ordinary skill in the field of the invention would make the combination." In re Oetiker, 977 F.2d 1443, 1447, 24 USPQ2d 1443, 1446 (Fed. Cir. 1992). Accordingly, we cannot sustain the rejection of claim 22 and its dependent, claim 23.

CONCLUSION

The decision of the examiner rejecting claims 19 through 23 and 25 under 35 U.S.C. § 103 is affirmed as to claims 19 through 21 and 25 and reversed as to claims 22 and 23. Accordingly, the decision of the examiner is affirmed-in-part.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART

JAMES D. THOMAS Administrative Patent Judge	)	
PARSHOTAM S. LALL Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
ANITA PELLMAN GROSS Administrative Patent Judge	)	

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ROBBY T HOLLAND
TEXAS INSTRUMENTS INCORPORATED
POST OFFICE BOX 655474 M S 219
DALLAS, TX 75265